together again at the point of leaving the back lens, and must either leave it converging to some one fixed conjugate focus, or else parallel but not united; in the first case the combination could only be applicable to one fixed length of body, and in the other it would not be satisfactory under any conditions. The cure for this seemed to be, and proved to be, to transpose the single middle and the triple back; the over corrected triple bringing together the rays which had been separated by the single front, and the single lens of longer focus making the rays parallel at the point of final emergence. The single front is nearly alike in all cases, varying only with the power required; the triple middle is of about three times, and the single plano-convex back four and a half times the radius of the front. The single plano-convex of long focus is reversed when transferred from the middle to the back position, the plane surface being above instead of below. Perfect color correction can be obtained by this formula in all screw collar objectives, from $\frac{1}{2}$ inch upwards. This combination consists of five lenses and ten surfaces, taking the place of eight lenses with sixteen surfaces.

These results are worked out by diagrams more easily than by mathematical computation; the course of the rays being projected by means of proportional compasses, with surprising accuracy, on a scale of some fifty times the size of the real combination.

TOLLES' TRIPLETS. — A correspondent writes as follows regarding a half inch triplet lately made by Mr. Tolles. "I am greatly pleased with the lens. Its performance is *splendid*, and it really gives the naturalist when away from his microscope an extraordinary facility. I should be very sorry to be without it." We quote this from our friend's letter, which was by no means designed for publication. These triplets certainly surpass anything of the kind we have met with. Mr. Tolles has just finished a $\frac{1}{75}$ objective, which is perfectly satisfactory to himself.

NOTES.

IT is seldom that the sad record we are now obliged to make occurs in a single number of a magazine: — the loss by death of four valued contributors within so short a time.

Prof. JOHN LEWIS RUSSELL, of Salem, died on the 7th of June, in the 65th year of his age. Prof. Russell was one of the founders,

and for many years the president, of the Essex County Natural History Society, which afterwards became part of the Essex Institute. He was an active worker in botany, and though he never published the results of his labors to any great extent, he has for years been considered as an authority in New England cryptogamic botany to which he devoted most of his attention. Of a peculiar and retiring nature, he never made himself prominent among the scientists of the day, though by those who knew him intimately his learning was held in great respect. As a popular exponent of botanical subjects he was much appreciated.

Mr. GEORGE GIBBS, the distinguished American ethnologist and philologist, died at New Haven, on the 9th of April, in his fifty-eighth year. Mr. Gibbs, though a lawyer by profession, has been an extensive contributor to various departments of natural science, as well as to literature, but his special work since 1849, when he first visited the Pacific coast, has been in researches relative to the languages and history of the North American Indians. Since this period he has filled several important posts as geologist on several of the government surveys and added much to our knowledge of the geology and zoology of the western portion of our continent. At the time of his death he was engaged in superintending the printing of a quarto volume of the Smithsonian Contributions, containing several hundred series of Indian vocabularies which he had arranged in a most critical manner. We understand that this last work of Mr. Gibbs was so far perfected, that its completion will be entrusted to Dr. Roehrig who was assisting in the work.

Col. JOHN W. FOSTER, President of the Chicago Academy of Science, died at Chicago on the 29th of June, aged 58. Col. Foster, though an active laborer in science for many years, is perhaps best known as the joint author with Prof. Whitney of the government Report on the Mineral Lands of Lake Superior, published in 1850, and from his volume on the Mississippi Valley published a few years since, though he has contributed many papers and memoirs on geological and archæological subjects. He contemplated a series of articles on the "Mound builders of the Mississippi Valley" for this magazine, two of which were published, when his time became fully occupied in the preparation of a more extensive work on the subject, which was issued but a few weeks before he died. He was one of the original members

of the American Association for the Advancement of Science, of which he was president at the meeting held in Salem in 1869, and for many years has taken an active part in the proceedings of the Association.

Prof. HENRY JAMES CLARK died at Amherst, on July 1st, at the age of forty-seven. Prof. Clark first became known to the scientific world as a very promising student with Prof. Gray. He afterwards, and for twelve years, was associated with Prof. Agassiz as an assistant. In 1860 he was made adjunct professor of Zoology at Harvard, and afterwards held professorships at the Agricultural College of Pennsylvania, the University of Kentucky, and finally in 1872, at the Massachusetts Agricultural College at Amherst, where after much suffering his useful work was terminated. Prof. Clark was probably the most thorough histologist in this country, and was our best microscopist in the general acceptance of the term. His volume entitled "Mind in Nature" published some ten or twelve years since was the result of his micro-physiological studies. He was a large contributor to Prof. Agassiz' volumes on the Natural History of the United States, and he has also printed many important papers in the Memoirs of the American Academy, the Boston Society of Natural History, and various scientific journals. We understand that the Smithsonian Institution was publishing an extensive work by Prof. Clark, which we trust will not be delayed by his death. Prof. Clark was a member of the National Academy of Science and of the leading scientific societies in the country.

IT appears that the scientific results of the voyage of the Polaris, as revealed by the examination by the Secretary of War of Capt. Tyson and his comrades, when the vessel is rescued, as there are strong hopes she will be, promise to be very encouraging to the advocates of farther arctic explorations. The Polaris reached 82° 62′ north, where she was in the new straits she had discovered. The dredge was not used, but the records of the astronomical, meteorological, magnetic, tidal, and other departments of exploration appear to have been full, while the collections of natural history, including skins and skeletons of musk oxen, bears and other mammals, birds and eggs, marine invertebrates, plants and fossils, were very numerous.

Specimens of drift wood of the walnut, ash and pine were said

to have been picked up near the shores of Newman's Bay and Polaris Bay. On the shores of the latter bay in lat. 81° 38′ N. Capt. Hall "found that the country abounds with live seals, game, geese, ducks, musk cattle, rabbits, wolves, foxes, bears, partridges, lemmings, etc., etc."

The geographical results of the Polaris expedition, so far as they can now be ascertained from the testimony of Messrs. Tyson, Myers and their comrades, may be summed up briefly as follows. The open Polar sea laid down by Kane and Hayes is found to be in reality a sound forming an expansion of Kennedy channel to the northward and broken by Lady Franklin Bay on the west, and on the east by a large inlet twenty miles wide at the opening and certainly extending far inland. Its size was not ascertained, and Mr. Myer thinks it may be in fact a strait extending till it communicates with the Francis Joseph sound of the Germania and Hansa expedition, and with it defining the northern limits of Greenland. This inlet was called the southern fiord. North of it is the indentation of the shore called Polaris Bay by Captain Hall, where the Polaris wintered in lat. 81° 38′ north. The northern point of this bay was named Cape Tupton. Its southern point is yet without a name. From Cape Tupton the land trends to the northeast and from the eastern shore of a new channel from twenty-five to thirty miles wide opening out of the sound before mentioned. The trend of land continues to Repulse Harbor in lat. 82° 9′ north, the highest northern position reached by land during this expedition. From an elevation of 1700 feet at Repulse Harbor, on the east coast of Robeson's Straits, the land continues northeast to the end of these straits, and thence east and southeast till lost in the distance, its vanishing point bearing south of east from the place of observation. No land was visible to the northeast, but land was seen on the west coast, extending north as far as the eye could reach, and apparently terminating in a headland 84° north. Mr. Myer also stated that directly to the north he observed, on a bright day, from the elevation mentioned, a line of light, apparently circular in form, which was thought by other observers to be land, but which he supposed to indicate open water. Besides ascertaining accurately the condition and extent of what was before supposed to be an open polar sea, discovering the southern fiord to the southeast, and Roberts's Straits to the north, with another wide expanse of water beyond it and ex-

tending by examination and survey the coast line on the east up to latitude 82° 91′ north, and by observation somewhat farther prolonging the west coast to the northward and passing with the Polaris under steam the high latitude of 82° 16′ north — a point far beyond the limits of all previous navigation toward the pole— errors in the shore line of the west coast as laid down by Dr. Hayes, and also errors in the shore line of Greenland as laid down by Dr. Kane, were observed and corrected.

Mr. Clement R. Markham writes to "Nature" that from the results gleaned from the story of the boat's crew of the Polaris, there are renewed and strong arguments for the fitting out of an English arctic expedition, which has been urged for a year or two past.

The government has dispatched two vessels in search of the Polaris, with a good prospect of finding her and saving the valuable journals and specimens aboard.

Prof. C. A. White of Iowa State University and State Geologist of Iowa, has been appointed Professor of Geology and Natural History at Bowdoin College. This is a new chair, and its establishment shows that the interest in science that has always characterized this college is on the increase. The Cleaveland Cabinet of Natural History at Bowdoin College was dedicated July 10. The museum, formerly Massachusetts Hall, has a very handsome interior. The address was delivered by Hon. Nehemiah Cleaveland, and remarks were made by other gentlemen present.

The bryological books and exceedingly rich and important collections and preparations of mosses left by the late W. S. Sullivant are to be consigned to the Gray Herbarium of Harvard University, with a view to their preservation and long-continued usefulness. The remainder of his botanical library, his choice microscopes, and other collections are bequeathed to the State Scientific and Agricultural College, just established at Columbus, and to the Starling Medical College, founded by his uncle, and of which he was himself the senior trustee.

The Topeka Scientific Institute is the title of a society in Topeka, Kansas, two years old, devoted to general science. It closed for the season on April 18, having sustained a free course of popular scientific lectures during the winter.